U.S. Patent Application 09/809,602
Amendment Filed January 5, 2007
In reply to Office actions mailed October 5 and November 9, 2006

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IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.   (Currently amended) A method for target device discovery on a network comprising plurality of hosts, each of the hosts having a corresponding one of a plurality of initiators, the network further comprising a plurality of target devices in communication with one another, the method comprising:

5   identifying a master initiator from among the plurality of initiators connected to the plurality of hosts, other initiators of the plurality of initiators being at least one slave initiator;

multicasting transmitting a multicast signal from a master the master initiator over the network, the transmitting occurring continually at a multicast interval, the multicast signal being a signal that is sent to all nodes within the network;

10   transmitting a registration by a unicast signal to the master initiator, the registration being transmitted from each of the target devices connected to the network, the registration being transmitted in response to a first receipt of the multicast signal upon being connected to the network;

re-registering each target device connected to the network by transmitting a unicast

15 signal to the master initiator, the re-registering being performed periodically at a selected re-registration interval;

determining if a previously registered target device re-registered with the master initiator by a unicast to the master initiator;

removing the previously registered target device on a from a list of active target

20 devices connected to the network when the previously registered target device has not re-registered within a selected the selected re-registration interval, wherein the list of active target devices is maintained by the master initiator; and

sending out a next multicast signal, wherein the next multicast signal includes information regarding the previously registered target device when the previously registered

25 target device is determined to have re-registered since the multicasting of the signal during a

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current multicast interval, the current multicast interval being a period from a previous transmission of the multicast signal to the sending out of the next multicast signal, ~~the information regarding the previously registered target notifying other initiators to maintain the previously registered target on the list of targets~~.

2.   (Currently amended) ~~A method for target device discovery on a network as recited in~~ The method of claim 1, wherein each of the slave initiators maintains a separate list of active targets, each of the slave initiators maintaining ~~wherein the other initiators maintain~~ the previously registered target on ~~initiator-target lists~~ the separate list of active targets in response to receiving the information regarding the previously registered target, each of the slave initiators removing the previously registered target from the separate list of active targets automatically when no information is received from the master initiator regarding previously registered device within the re-registration interval.

3.   (Currently amended) ~~A method for target device discovery on a network as recited in~~ The method of claim 1, wherein the identifying of the master initiator ~~is elected by~~ comprises comparing device identification numbers of ~~a plurality~~ the plurality of initiators connected to the network.

4.   (Currently amended) ~~A method for target device discovery on a network as recited in~~ The method of claim 1, wherein the multicast signal ~~from the master initiator~~ is in a form of a master identification packet having a sequence number, the sequence number being incremented every time new target information is transmitted with the master identification packet, the new target information including new registrations of previously unregistered target devices and re-registrations of previously registered target devices.

5.   (Currently amended) A method for target device discovery on a network ~~as recited in claim 1, wherein the signal is a first multicast, the next multicast is a second multicast, the method further~~ comprising:

multicasting a signal from a master initiator over a network;

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5   determining if a previously registered target re-registered with the master initiator by a unicast to the master initiator;

removing the previously registered target on a list of active targets connected to the network when the previously registered target has not re-registered within a selected re-registration interval; and

10   sending out a next multicast, wherein the next mulicast includes information regarding the previously registered target when the previously registered target is determined to have re-registered since the multicasting of the signal, the information regarding the previously registered target notifying other initiators to maintain the previously registered target on the list of targets; and

15   causing a second initiator, in response to receiving a third multicast, the third multicast not including the information regarding the previously registered target, to compare a sequence number of the third multicast with a previous sequence number of a previous multicast, the previous multicast being a most recently received multicast prior to the third multicast.

6.   (Previously presented) A method for target device discovery on a network as recited in claim 5, wherein the second initiator determines that a multicast has been missed when the difference between the sequence number of the third multicast and the previous sequence number is greater than one and target information is included in the third multicast,

5   the second initiator also determining that a multicast has been missed when the difference between the sequence number of the third multicast and the previous sequence number is equal to one and the third multicast does not include target information.

7.   (Previously presented) A method for target device discovery on a network as recited in claim 6, further comprising causing the second initiators to request target information contained in the second multicast when the second initiator determines that a multicast has been missed.

8.   (Canceled).

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9. (Currently amended) ~~A method for target device discovery on a network as recited in~~ The method of claim 1, wherein the network is one of an iSCSI network, an eSCSI network, a TCP/IP network, and an Ethernet network.

10. (Currently amended) ~~A method for target device discovery on a network as recited in~~ The method of claim 1, wherein the ~~previous registered target re-registers by unicasting information to the master initiator on a periodic basis~~ next multicast transmission does not include information regarding the previously registered target device when the master initiator removes the previously registered target device from the list of active target devices.

11. (Currently amended) A method for target device discovery on a network having a plurality of hosts and a plurality of target devices in communication with one another, each of the plurality of hosts having an initiator, the method comprising:

identifying a master initiator as one of the plurality of initiators, each of the plurality of initiators being either a master initiator or a slave initiator;

~~multicasting~~ transmitting a multicast signal from ~~a master~~ the master initiator over the network;

receiving, at the master initiator, a unicast signal from a new target device recently connected to the network;

adding the new target device to a master list of target devices connected to the network, the master list of target devices being maintained by the master initiator; [[and]]

sending out a next multicast signal ~~to initiators~~, the next multicast signal being received by the slave initiators, the next multicast signal including information regarding the new target device; and

adding the new target device to a separate list of target devices at each slave initiator such that each slave initiator is made aware of all of the target devices currently connected to the network.

12.   (Original)   A method for target device discovery on a network as recited in claim 11, wherein the network is one of an iSCSI network, an eSCSI network, a TCP/IP network, and an Ethernet network.

13.   (Canceled)

14.   (Currently amended)   A method for target device discovery on a network as recited in claim 11, wherein the master initiator is ~~determined~~ identified from among the plurality of initiators by comparing device identification numbers of ~~a plurality~~ the plurality of initiators connected to the network.

15.   (Previously presented) A method for target device discovery on a network as recited in claim 14, wherein the device identification number is a global unique identification (GUID) number.

16.   (Currently amended) A method for target device discovery on a network as recited in claim 11, wherein the signal from the master initiator is in a form of a master identification ~~packets~~ packet having a sequence number, the sequence number being incremented every time new target information is transmitted with the master identification packet, the new target information including new registrations of previously unregistered target devices and re-registrations of previously registered target devices.

17.   (Currently amended)   A method for target device discovery on a network ~~as recited in claim 11, the method further~~ comprising:

    multicasting a signal from a master initiator over the network;

    receiving a unicast from a new target recently connected to the network;

    adding the new target to a list of targets connected to the network;

    sending out a next multicast to other initiators, the next multicast including information regarding the new target; and

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causing a second initiator, in response to receiving a third multicast from the master initiator, the third multicast not including the information regarding the new target, to

10   compare a sequence number of the third multicast with a previous sequence number of a previous multicast, the previous multicast being a most recently received multicast prior to the third multicast.

18.   (Previously presented) A method for target device discovery on a network as recited in claim 17, wherein the second initiator determines that a multicast has been missed when the difference between the sequence number of the third multicast and the previous sequence number is greater than one and target information is included in the third multicast ,

5   the second initiator also determining that a multicast has been missed when the difference between the sequence number of the third multicast and the previous sequence number is equal to one and the third multicast does not include target information.

19.   (Previously presented) A method for target device discovery on a network as recited in claim 18, further comprising causing the second initiator to request target information contained in the next multicast when the second initiator determines that a multicast has been missed.

20.   (Currently amended) A method for target device discovery on a network as recited in claim 11, further comprising sending additional multicast signals on a periodic basis, the additional multicast signals not including the information regarding the new target device.

21.   (Currently amended) A method for target device discovery on a ~~network~~ network, the method being implemented by a master initiator, the master initiator including logic for implementing the method, the method comprising:

transmitting a plurality of multicasts over the network, the [[the]] multicasts being

5   transmitted continually at a predetermined interval;

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in response to receiving a unicast from a new target <u>device</u> recently connected to the network, adding the new target <u>device</u> to a list of target <u>devices</u>;

in response to determining that a previously registered target <u>device</u> re-registered with the master initiator, maintaining the previously registered target <u>device</u> on the list of target

10   <u>devices</u>;

wherein one of the multicasts includes <u>new target device</u> information regarding the maintaining and the adding of target <u>devices</u> to the network<u>; and</u>

<u>wherein each multicast has a sequence number, the sequence number being incremented every time the new target information is included in the multicast.</u>

22.   (Currently amended)   A method for target device discovery on a network as recited in claim 21, wherein the ~~previous~~ <u>previously</u> registered target re-registers by unicasting information to the master initiator on a periodic basis.

23.   (Currently amended)   A system for target device discovery on a network comprising:

a master initiator, the master initiator configured to periodically ~~send~~ <u>transmit</u> a multicast <u>signal</u> throughout the network <u>at a predetermined interval</u>;

5   at least one target <u>device,</u> the at least one target <u>device being</u> configured to remain passive until one of the multicast <u>signals</u> is received from the master initiator<u>, the at least one target device being further configured to transmit a unicast response to the master initiator upon first receiving one of the multicast signals, the unicast response including an address of the at least one target device, the at least one target device further being configured to</u>

10   <u>periodically re-register with the master initiator at a re-registration interval</u>; and

at least one slave initiator, the at least one slave initiator configured to receive target information from the multicast <u>signals</u>~~;~~

~~wherein the master initiator polls the at least one target by way of the multicasts, and the at least one target responds to the one multicast through use of a unicast directed to the~~

15   ~~master initiator.~~

24.   (Original)   A system for target device discovery on a network as recited in claim 23, wherein the at least one slave initiator is configured to unicast to the master initiator a request to resend information if a multicast with updated target information was not received by the at least one slave initiator.

25.   (Original)   A system for target device discovery on a network as recited in claim 24, wherein the at least one slave initiator is configured to determine if the multicast with updated target information was not received by examining a sequence number of each multicast to determine if a previous multicast was missed.

26.   (Original)   A system for target device discovery on a network as recited in claim 25, wherein the previous multicast was missed when a last sequence number from a last multicast has incremented and no updated target information has been received.

27.   (Original)   A system for target device discovery on a network as recited in claim 23, wherein the network is one of an iSCSI network, an eSCSI network, a TCP/IP network, and an Ethernet network.